Parent, School and Peer Factors and Their Influence on HIV Risk Behaviors among Urban High School Adolescents in Honduras: Application of Ecodevelopmental Theory

博 士 論 文

Parent, School and Peer Factors and Their Influence on HIV Risk Behaviors among Urban High School Adolescents in Honduras: Application of Ecodevelopmental Theory

ホンジュラス国都市部に在住する高校生の HIV リスク行動と親・学校・仲間因子の影響に関する研究―エコ・ディベロップメンタル理論の適用

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I. ABSTRACT

Background

HIV risk behaviors among adolescents are known to be influenced by multiple environmental factors surrounding adolescents, such as family, school and peers, through their development process. A number of previous studies have demonstrated the relations between those environmental factors and adolescents' HIV risk behavior. However, most of those studies examined only direct influences of environmental factors, or simple cause-and-effect relation. According to Ecodevelopmental Theory, those factors do not operate in isolation but function within the multi-social systems where those environmental factors are situated either distal or proximal to adolescents. The present study aimed to examine the relative influences of the factors applying partial least square path modelling within multi-social systems on HIV risk behaviors of urban high school students in Honduras.

Methods

A cross-sectional survey on factors of family, school and peers and adolescents' HIV risk behaviors and knowledge was administered to 333 high school students in three cities in Honduras. Based on Ecodevelopmental Theory, factors of multi-social systems were categorized as; 1) religion as macrosystem, 2) factors on socio-economic status of parents as exosystem, 3) adolescent-parent relationships, school and peers as microsystem, 4) knowledge of HIV prevention as an individual factor and 5) HIV risk behaviors as outcome factors. Partial least square path modelling was applied to assess the relationship among those factors.

Results

HIV risk behaviors as well as knowledge of HIV prevention were influenced from macrosystem (religion) and exosystem (socio-economic status of parents) mediated through microsystems. Direct and mediating influences of HIV risk behaviors were shown as follows.

First, early onset of sexual activities was occurred due to low income of parents mediated thorough the influence of peers with antisocial behaviors. Second, less condom use was due to a) having no religion mediated through the influence of poor parent-adolescent communication and poor parental monitoring; b) low income level of parents mediated through the influence of peers with antisocial behaviors; c) living with single parent or no parents mediated through the influence of not having trusting relationship with their peers. Third, having multiple sexual partners was due to having no religion mediated through the influence of poor parent-adolescent communication and poor parental monitoring.

Conclusions

HIV risk behaviors of urban high school adolescents in Honduras are influenced mediated through multiple factors in different social systems that are situated at varying distances from the adolescent; that is, influences come from macrosystem and exosystem through microsystem, which in turn, influenced on HIV risk behaviors. Involvement of multiple aspects, such as parents, schools and peers, was recommended in HIV prevention interventions.

II. BACKGROUND

1. HIV Risk Behaviors and Adolescents

The epidemic of human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) is a major concern in both developed and developing countries. Despite the contribution of anti-retroviral medications to decline death rate since its introduction in 1996[1], HIV transmission remains upstream challenging problem.

Adolescents (aged 10-19) are known as a high risk group of HIV infection. Since the majority of HIV infections among adolescents are through HIV risk behavior such as having the first intercourse in early ages, multiple sexual partners and no use of contraceptive methods, prevention and behavioral change of such HIV risk behavior have been considered as one of effective interventions to prevent the HIV transmission among adolescents[2]. Environmental factors surrounding adolescents, such as parent-adolescent communication, socio-economic status of family, and social peer influences, are generally known to influence those HIV risk behaviors[3]. Previous studies have demonstrated the relations between those environmental factors and adolescents' HIV risk behaviors, while some showed no relations or mixed results. For example, most studies showed the influence of parental monitoring to decrease adolescent's HIV risk behaviors such as sexual intercourse and condom use[4-10]. On the other hand, some studies showed the influence of socio-economic condition of parents[6, 11], while others did not[7, 8, 12]. A review of studies of communication and sexual issues in sub-Saharan Africa showed that the impact of communication on sexual issues and sexual behaviors was still inconclusive because of their mixed results[13]. Regarding school and peer influences, previous studies showed that risky sexual behaviors such as condom use and multiple sexual partner were significantly associated with peer influence[11, 14, 15], but not school attachment[15].

Those mixed results may have occurred because those studies examined only linear and direct influences of risk factors on HIV risk behaviors; that is, most studies examined a simple cause-and-effect relation between single risk factor and behavior and may have underestimated the assumption that those risk factors are the part of a complex set of influences and do not operate in isolation.

2. Ecodevelopmental Theory to Understand Adolescent's HIV Risk Behaviors

According to Bronfenbrenner's work on the social ecology of human development[16], multiple influences on adolescent development function within multi-social systems. Therefore, careful consideration of the social systems is necessarily to understand risk and protective factors for adolescent problem behaviors[2, 17]. Those social systems are represented by a set of nested systems and the risk/protective factors in those systems interact with one another[17]. The parents' risk/protective factors that influence adolescents' HIV risky behaviors also function in the mentioned nested social systems. Because of its application of nested social systems and focus on parents, the Ecodevelopmental Theory[18] can be an appropriate platform for comprehensive understanding.

The Ecodevelopmental mentions that factors that surround and influence adolescents are situated at varying "distances" from them. For example, parent–adolescent communication is proximal to the adolescent and parent's socioeconomic condition is somewhat more distal [17]. In addition, those risk factors situated at varying "distances" do not operate in isolation; rather, they function within proximal–distal continuum of influence [19]. In other words, risk factors distal to adolescents influence through another risk factors proximal to them. If the role of any single factor is studied in isolation from other operating factors, it became clear that its role could be overstated or underestimated[18]. According to the Ecodevelopmental Theory, multidimensional consideration is necessary to understand the

mechanism that influence on adolescent HIV risk behavior. Figure 1 illustrates the concentric nature of ecodevelopmental theory. "Statistical Model" of the Methods section describes each of the systemic levels in more detail.

Studies in the U.S. tested and confirmed the usability of the framework of Ecodevelopmental Theory to examine the relationship of risk factors surrounding adolescents and their health risk behaviors, such as HIV risk behaviors[19-23] , substance use[24-26] and others[27-30]. Although those studies suggested the application of its theoretical framework to other social settings, no studies have been conducted in other countries.

3. HIV Risk Behaviors and Adolescents in Honduras

Honduras is the second most affected country in Central America to HIV/AIDS, after Belize. The prevalence rate of HIV was about 0.66% in the population in 2009 (2.3% in Belize) and 76% of HIV/AIDS patients were found four provinces or *departamentos* (Cortés, Francisco Morazán, Atlántida and Yoro) with concentration on urban areas. The ratio of HIV-infected men and female was 2:1 in 1986, but is almost 1:1 in 2005. Similar to other countries in Central America, majority of the primary source of HIV transmission was unprotected penetrative sex with the infected persons[31](92% in Honduras), the rest 8% was due to mother-to-child transmission, intravenous drug use and blood transfusion.

For adolescents aged 15-19, the prevalence of HIV/AIDS is nearly 10 per 100,000 people. Unlike some countries in Central America (Guatemala, Belize and Nicaragua), the prevalence of HIV in Honduras is being decreased since 1990s. However, the prevalence of HIV/AIDS in adolescents has not been decreased in the past 10 years. In addition, nearly half of the people aged 20-39 with HIV/AIDS (around 30% to 40% in other countries in Central America) had HIV infection in their adolescence due to HIV risk behaviors[32].

National Strategic Plan to Response HIV/AIDS 2008-2012 (Plan Estratégico Nacional de Respuesta al VIH y SIDA)[33], developed by the National Commission on AIDS of the Ministry of Health in Honduras (La Comisión Nacional del Sida en Honduras, or CONASIDA), recognized the importance of active involvement of parents, school and peers to decrease HIV risk behavior of adolescents. However, almost no research has been conducted to examine the influence of those environmental factors, except the one that showed the influence of peer relationship and family status on sexual abstinence and consistent condom use[34], and the one that showed higher socioeconomic condition would delay the age at which they become sexually active[35]. This could be an obstacle to design effective interventions on HIV prevention for adolescents. Therefore, more research is needed to provide more understanding of HIV transmission mechanisms among adolescents in Honduras.

4. Application of Partial Least Square Structural Equal Modelling

As mentioned in previous sections, previous studies showed some mixed results on the influence of risk factors on HIV risk behaviors because those studies examined only linear and direct influences, which might have overstated or underestimated[18] the functions of risk factors. To examine the function of environmental factors that influences on HIV risk behaviors in an appropriate manner, as described in Ecodevelopmental Theory, there was a need to consider mediating influences in addition to direct influences; and partial least square (PLS) is one of the best approaches.

PLS is one of structural equation modelling (SEM) analyses. SEM is an extension of general linear modeling procedures, such as the ANOVA and multiple regression analysis. Primary advantages of SEM are; the ability to test models with multiple dependents; the ability to model mediating variables and to test coefficients across multiple between-subjects

groups[36]. Although covariance-based SEM (CB‑SEM) is the one that is frequently used to analyze the structural model[36], PLS is more applicable SEM method here because obtained data did not have multivariate normality and sample size is relatively small. PLS provides more robust estimations of the structural model in the current case[37]. Therefore, PLS is particularly suited to the present study.

III. PURPOSE STATEMENT

The purpose of the present study was to examine the relative influences of the multiple environmental factors within multi-social systems on HIV risk behaviors of urban high school students in Honduras. An Ecodevelopmental framework was applied to examine those environmental factors, including macrosystem, exosystem, family-, school- and peer-microsystems and individual factors (knowledge and HIV risk behaviors). For data analysis, partial least square regression analysis was used.

IV. METHODS

1. Study design and participants

A cross sectional study design was applied and the dataset contained responses from un-married 333 high school students from three largest cities, Tegucigalpa, San Pedro Sula and La Ceiba. Those cities were selected because they are the capital cities of the provinces, or *departamentos,* which have the highest HIV prevalence rates (more than 158 cases per 100,000 people) in Honduras [32]. Data were missing for 13 participants. This analysis used complete only cases (N = 320).

Recruitment of the participants for this study took place from July 2011 to November in 2012. Three public high schools and three private high schools were selected in above three cities. The selected schools were the biggest ones in the city. All students, except the ones who were absent, of the randomly selected eighteen (18) classes participated in the survey. The sampling approaches and procedures were similar across three cities.

2. Ethical Considerations

A letter was sent to each school that described the study objectives, methods, and the questionnaire. All schools agreed participations of the survey. Prior to conducting a study, an oral and written description of the study including the study's voluntary and confidential nature was provided to all potential participants. The current study was approved by the Ethics Committee of the Tohoku University. In addition, in order to conduct a survey in Honduras, the study was also approved by the Department of the Research Development, National Autonomous University of Honduras, which functions as an ethics committee of the Government of Honduras.

3. Statistical Model

The model tested in the present study was built based on an Ecodevelopmental framework, including microsystems, exosystems and macrosystems (see Figure 1). All environmental factors used in the model were corresponded to the elements defined in the Ecodevelopmental Theory[18].

Microsystem is defined as the contexts (family, peers, and school) most proximal for the developing adolescent, in which the adolescent participates directly. In other words, within each microsystem, adolescent interacts with a network of people who affect his or her healthy development. Family domain includes family support for the adolescent through, parent–adolescent communication, parent–adolescent communication about sex, and parental monitoring for discipline and limit setting. School domain includes student attitude toward school. Peer domain includes trusting relationship with peers and peers' socially accepted attitudes and behaviors. Based on those definitions, the microsystem factors used in the present study were 1) family microsystem: three factors on parent-adolescent communication, parent-adolescent communication on sexual and reproductive issues and parental monitoring; 2) school microsystem: school attachment factor; 3) peer microsystem: two factors on connectedness to peers and antisocial behaviors of peers.

Exosystem is the context in which the adolescent does not participate directly but that impact important members of the adolescent's life. Generally, this signifies socioeconomic status of parents such as parents' income and parent's education level. Based on the definition, the exosystem factors used in the present study were parents' income, parent's education level and living arrangement.

Macrosystems are defined as society's broad social and cultural patterns which may include cultural/religious influences on individuals and families[18]. In the present study,

religion was applied as a product of macrosystem factor because it still plays a significant role in the society in Honduras.

Outcomes related to HIV risk domains include the knowledge of HIV/AIDS and HIV risk behaviors (sex experience, age of first sex experience, condom use and the number of sexual partner). Those factors were applied because they are the main HIV risk behaviors that cause HIV transmission[1].

The current study applied two different models according to participant's sex experience. Model 1 was applied for all participants (n=320) to examine how environmental factors influence on what if participants have had sex or no. Model 2 was applied to the participants who have had sex (n=130) to examine how environmental factors influence on the occurrences of HIV risk behaviors, such as if age of the first sex, condom use and the number of sexual partners.

4. Measures

The model, as explained above, consists of the latent constructs, or factors, that represent exosystem, microsystems and outcomes and each factor include one to seven measured variables. Table 1 provides a list of factors and related measurement items.

a. Macrosystem

Religion was assessed using one-item form, on which participants provided the information whether they were catholic, protestant, other religion and no religion. The categories of this item was applied from the questionnaires of the Demographics Health Survey in Honduras[38].

b. Exosystem

Socio-economic status of parents was assessed using a three-item form, on which participants provided their living arrangement, parents' income and parents' education level.

Living arrangement was measured using five categories by asking if the participant live with both parents, one parent or grandparent(s) and/or other adult relative member(s). Parents' income was measured using eight categories that range from "3,000 lempiras or less" to "50,000 lempiras and more." (1 US dollar is approximately 20 lempiras). Parents' education level was measured using six categories that include "no education" and "university and higher." The categories of those items were developed based on the questionnaires of the Demographics Health Survey in Honduras[38].

c. Family microsystem

Parent-adolescent communication was assessed with a seven-item form, on which participants provided the information how they share information, ideas, thoughts and feelings as members of a family unit. Questions were applied from the Family Communication Scale[39]. Parent-adolescent communications on sexual and reproductive issues was assessed with seven items related to sexual and reproductive health topics[10]. Parental monitoring was assessed with selected five-item form applied from Strictness/Supervision Scale[5]. All items of those three factors were measured with 5-point Likert scale.

d. School microsystem

School attachment was assessed with four items, respectively, applied from School Bonding/Commitment Scale[40] to examine participants' commitment to school in terms of importance of school and assignments and level of interest/enjoyment in school. All items of those three factors were measured with 5-point Likert scale.

e. Peer microsystem

Connectedness to peers was assessed with four items using Social Support Appraisals scale [41] to examine participants' subjective feelings regarding support resources and interactions. Antisocial behavior of peers also had four items and applied from Interaction

with Antisocial Peers Scale[42]. All items of these two factors were measured with 5-point Likert scale.

f. Knowledge of HIV prevention

Knowledge of HIV prevention was assessed with 14 questions on knowledge of HIV prevention methods and other general knowledge for HIV prevention. Questions were applied from the Demographics Health Survey in Honduras[38].

g. HIV risk behavior

HIV risk behavior was assessed based on indicators defined by the Joint United Nations Programme on HIV/AIDS[43]. Sex experience was used in the first group (Model 1) whereas age of the first sex, condom use and the number of sexual partner were used in the second group (Model 2). Age of the first sex, condom use and the number of sexual partner were not used in the first analysis because there was no sense to include those items to those who have not had sex. "Sex experience" was a dichotomous item with "yes" or "no." Age of the first sex and the number of sexual partner had multiple scales. Condom use had three items where the participants responded if they used condoms when they had sex for the first time, when they had sex last time and every time when they had sex.

h. Questionnaire

The questionnaire was developed in Spanish language version. Sections that applied standardized questionnaire format in English were translated to Spanish, which were proofread and back-translated by two Spanish native speakers from Honduran. Practical utility of the questionnaire was confirmed through a series of pilot tests conducted to 61 high school students in Tegucigalpa.

5. Data Analysis

Partial least square (PLS) path modelling was applied to test the relative relationship of predictors and outcomes as well as mediators in the present study. PLS comprises a measurement model and a structural model. The measurement model specifies relations between measured variables and latent constructs, or factors. The structural model specifies relations between factors.

In addition to PLS, multivariate regression analysis was conducted to compare its results with those of PLS. The data analysis was conducted with SmartPLS 2.0 M3 and JMP 10.0.0.

V. RESULTS

1. Descriptive Statistics

Demographic characteristics of 320 high school students in urban Honduras are presented in Table 2. Participants (N=320) were from Tegucigalpa (n=114), capital city of Honduras, San Pedro Sula (n=107), the second largest city and industrial centre and La Ceiba (n=99), the third largest city. Among all participants, 191 were female and 129 were male. Nearly 80% were 16 and 17 years old, since they were recruited in the 11th and 12th grades. Parent's income range was described as between $50 and $9,000 a month. More than 60% of parents earn less than US$ 1,000 a month. Only 50% of participants live with both parents and 7% live with single parent and grandparent(s) and 28% with only single parent, respectively. 41% of participants' parents went to universities whereas 17% completed secondary education and 29% completed primary education. 11% did not completed primary education and 1% has never been to school. Among 320 participants, 41% of them (n=130) have had sex experiences.

2. Measurement model

There are four statistics to examine the relations between measured variables and factors; factor loading for each factor, reliability, convergent validity of the variables and discriminant validity.

First, factor loadings for each factor were assessed (see Table 3) to examine if each variable is reliably contributed to the corresponded factor. One variable from Connectedness to Peers was removed from the scale because of low factor loading (below 0.5) and not used in further analysis because those variables would potentially bias the estimates of parameters[44].

Reliability was then assessed using Fornell and Larcker's measure of composite reliability [45] to measure internal consistency of variables. As shown in Table 4 (Model 1) and Table 5 (Model 2), all values were above 0.7, which demonstrated acceptable reliability[46].

Convergent validity of the variables was assessed by examining the average variance extracted (AVE) statistics (Table 4 & 5). AVE values are suggested be greater than 0.50[46]. Results showed that two factors in Model 1 (Table 4) were 0.485 and 0.486, respectively. Although those AVE values were less than 0.5, they are close to 0.5; therefore it can be considered as acceptable validity[46].

Discriminant validity was then assessed to examine the extent to which a given factor differs from other factors. Table 4 (Model 1) and Table 5 (Model 2) showed that the square roots of the AVEs (diagonal) are all greater than each of the factor correlations, showing the acceptable validity[46]. Overall, each factor exhibited satisfactory reliability and validity[47].

3. Structural model

Structural model was then assessed to examine the relations between factors, or latent factors. Standardised path coefficients between factors, standard deviation and t-statistics of structural model were reported in Table 6 for Model 1 and Table 7 for Model 2, respectively. Path coefficient statistics showed significant of path associations between two factors. Significant path coefficient and R-square for each endogenous factor were shown in Figure 3 for Model 1 and Figure 4 for Model 2, respectively. R-square provides a measure of how well observed outcomes are replicated by the model[37]. As PLS makes no distributional assumptions, bootstrapping was used to evaluate the statistical significance of each path coefficient[48].

a. All participants (n=320)

i) R-squared

As shown in Figure 3, R-square results showed that the model explained 11.7% of the variance in "Sex Experience" and 12.5% of the variance in "Knowledge of HIV Prevention" among all participants. Although the values are considered as relatively "weaker" in general, according to Hair et al.[37], the judgment of acceptable R-square level depends on the specific research disciplines. For example, in the field of consumer behavior, R-square results of 0.20 are considered high[37]. Since the present study also examine human behavior patterns, the R-squares of "sex experience" and "knowledge of HIV prevention" can be considered as "acceptably moderate."

ii) Path coefficient

Results of path coefficient statistics showed various significant associations between factors (Figure 3). There were associations between macrosystem and other factors such as: between "religion" and "education level of parents" ($\beta = 0.127$, $p < 0.01$) and "parent-adolescent communication" ($\beta = 0.137$, $p < 0.01$), respectively. Associations between exosystem and other factors were: between "parents' income" and "school attachment" ($\beta = -0.286$, $p < 0.001$), "antisocial behavior of peers" ($\beta = 0.228$, $p < 0.001$) and "sex experience" ($\beta = 0.147$, $p < 0.01$); between "education level of parents" and "parental monitoring" ($\beta = -0.176$, $p < 0.01$) and "connectedness to peers" ($\beta = 0.258$, $p < 0.001$); between "living arrangement" and "school attachment" ($\beta = -0.146$, $p < 0.01$), respectively. Between microsystem and other factors, following associations were shown: between "parent-adolescent communication" and "knowledge on HIV prevention" ($\beta = -0.127$, $p < 0.05$); between "parent-adolescent communications on sexual and reproductive issues" and "knowledge on HIV prevention" ($\beta = 0.165$, $p < 0.01$); between "parental monitoring" and "knowledge on HIV prevention" ($\beta = 0.220$, $p < 0.001$) and "sex experience" ($\beta = 0.177$, $p <$

0.01); between “school attachment” and “knowledge on HIV prevention” (β =-0.177, p < 0.01); between “connectedness to peers” and “sex experience” (β =0.137, p < 0.05); between “antisocial behavior of peers” and “sex experience” (β =0.125, p < 0.05), respectively. There was also a significant association between “knowledge on HIV prevention” and “sex experience” (β =0.113, p < 0.05).

b. Participants who have had sex (n=130)

i) R-squared

R-square results in Figure 4 showed that the model explained 20.0% of the variance in “age of the first sex,” 18.0% of the variance in “condom use,” 23.8% of the variance in “number of sexual partner” and 14.6% of the variance in “knowledge of HIV prevention” among the participants who have had sex. Because of the justification mentioned above, all endogenous factors are considered as “acceptably moderate.”

ii) Path coefficient

Results of path coefficient statistics showed various significant associations between factors (Figure 4). There were significant associations between “religion” and “parent-adolescent communication” (β = 0.188, p < 0.01), “parent-adolescent communication on sexual & reproductive issues” (β = 0.150, p < 0.05) and “parental monitoring” (β = 0.155, p < 0.05), respectively. Associations between exosystem and other factors were: between “parents’ income” and “school attachment” (β =-0.264, p < 0.01), “antisocial behavior of peers” (β = 0.183, p < 0.05), “knowledge of HIV prevention” (β = -0.274, p < 0.01) and “condom use” (β = 0.322, p < 0.001); between “living arrangement” and “connectedness to peers” (β =0.192, p < 0.05).Between microsystem and other factors, following associations were shown: between “parent-adolescent communication” and “condom use” (β =0.238, p < 0.01) and “number of partners” (β =0.168, p < 0.05); between “parent-adolescent communications on sexual and reproductive issues” and “knowledge on HIV prevention” (β = 0.248, p < 0.01); between

"parental monitoring" and "condom use" (β =0.142, p < 0.05) and "number of partners" (β = 0.168, p < 0.05); between "school attachment" and "knowledge on HIV prevention" (β =-0.254, p < 0.01); between "connectedness to peers" and "condom use" (β =0.183, p < 0.05); between "antisocial behavior of peers" and "age of the first sex" (β =0.207, p < 0.05) and condom use" (β =0.135, p < 0.05), respectively. No association was observed between "knowledge on HIV prevention" and outcome factors (HIV risk behaviors).

4. Multivariate regression analysis

Results showed that, in Model 1, significant predictors of sex experience were "living arrangement" (β = 2.081, p < 0.05), "parent-adolescent communication" (β = 6.177, p < 0.05), "parent-adolescent communications on sexual and reproductive issues" (β = 4.545, p < 0.05), "parental monitoring" (β =5.079, p < 0.05) and "knowledge of HIV prevention" (β = 4.693, p < 0.05). In Model 2, there was no significant predictor of the age of the 1st sex, while "parent-adolescent communication" (β = 6.177, p < 0.05) was a significant predictor of condom use. In addition, "parental monitoring" (β = 9.960, p < 0.01) and "antisocial behavior of peers" (β = 4.455, p < 0.01) were significant predictors of the number of partners.

VI. DISCUSSION

HIV risk behaviors among adolescents are influenced by multiple environmental factors as shown in previous studies. However, most of these studies examined linear and direct influences of those factors only, which might have overstated or underestimated their roles. The present study attempted to provide more comprehensive understandings of this mechanism to reveal how those environmental factors function within multi-social systems to influence the patterns of adolescents' HIV risk behaviors.

An Ecodevelopmental framework consisting of macrosystem, exosystem, and family-, school- and peer microsystems was applied to examine the relative influence of the factors within multi-social systems on HIV risk behaviors and knowledge of urban high school students in Honduras. Results revealed the existence of multiple influential paths between factors within hypothesized models. Following sections discuss on details of those findings.

1. Function of Ecodevelopmental Social System

a. Macrosystem as causal factor

Results showed that religious difference influenced on education level of parents among all participants and all three factors of family microsystem ("parent-adolescent communication", "parent-adolescent communication on sexual & reproductive issues" and "parental monitoring") among the students who have had sex. This implicates that among the students who have had sex, students with no religion tend to have poor parent-adolescent communication, poor parent-adolescent communication on sexual & reproductive issues, poor parental monitoring.

b. Exosystem as a causal factor and mediator

Results showed that all exosystem factors influenced on microsystem factors and outcome factors. Among them, parents' income level influenced many factors compared with

other two exosystem factors. More concretely, parents' income influenced on school and peer microsystem factors as well as outcome factors. Previous studies showed that among socioeconomic status of parents, income level of parents showed HIV risk behaviors such as condom use and sex experience, although other socioeconomic status of parents did not, such as education level, living arrangement and marital status[6, 12]. The present study supported those findings.

Education level of parents is the only exosystem factor that functioned as a mediator between macrosystem and microsystem. In other words, students with no religion tend to have the parents with lower education level, which in turn, could cause poor parental monitoring and weak connectedness to peers.

Living arrangement influenced on connectedness to peers and school attachment. In other words, students who live with single parent or no parents tend to have weaker connected to peers but more school attachment than those who live with both parents or single parent with grandparent(s). In Honduras, three-generation household is still common and grandparents serve as parental figure, especially in case of single parent. Therefore, results indicated the role of grandparents.

c. Microsystem as mediator

Results showed that HIV risk behaviors as well as knowledge of HIV prevention were influenced from religion, or macrosystem, and education level of parents, one of exosystem factors, mediated through microsystems.

Parental monitoring

Among microsystems, parental monitoring was the mediator that connected from macrosystem or exosystem to knowledge of HIV and three out of four HIV risk behaviors (sex experience, first age of sex and number of sexual partners). Most studies showed significant influences on HIV risk behaviors[4-10]. In addition to the results of those studies, the

present study showed that parental monitoring itself does not influence on risk behaviors, but it receives the influence from macrosystem or exosystem, which in turn influence on HIV risk behaviors. Among the students who have had sex, students with no religion tend to have poor parental monitoring, which in turn, could cause less frequent use of condom and larger number of the number of sexual partner.

Parent-adolescent communication

Both parent-adolescent communication and parent-adolescent communication on reproductive health issues served as mediators between macrosystem (religion) and HIV risk behaviors or knowledge. In other words, students with no religion tend to have poor communication with parents, which in turn, could cause poor knowledge on HIV prevention, less use of condom, or increased number of sexual partners. Although general communication among parents and adolescents influenced both knowledge and HIV risk behaviors, communication on reproductive issues influenced on only knowledge. A review of studies of communication and sexual issues in sub-Saharan Africa showed that the impact of communication on sexual issues and sexual behaviors was still inconclusive[13]. This may be because adolescents do communications on both general issues and sex-related topics with peers and teaches[49-51], not only with parents and therefore adolescents may receive "communication" influence on sexual behaviors from other than parents [49]. Given the findings of previous studies and the present study, influences of peers and school – including teachers – are the issue that should be examined together when considering the relation of communication and HIV risk behaviors.

School attachment

Results showed mediation effect of school attachment between exosystem factors (parents' income and living arrangement) and knowledge of HIV prevention. Interestingly, results showed school attachment was negatively associated with socioeconomic status as

well as knowledge of HIV prevention, indicating that students with lower socioeconomic status of parents have stronger school attachment, which in turn, could cause lower knowledge of HIV prevention. Poor knowledge of HIV prevention despite better school attachment may have caused because schools in Honduras do not provide sexual health education appropriately. Truly, sexuality and sexual health theme is still taboo in Honduras and many teachers are not comfortable discussing those issues and did not follow the curriculum of sexual health education[52, 53]. Therefore, students who like classes and teachers tend not to learn the issue of sexuality. High school students in Honduras may learn this issue outside of school. Further studies will be warranted for more clear understandings of the impact of sexual health education in school setting.

Peer influence (antisocial behaviors of peers and connectedness)

Mediation effect of antisocial behaviors of peers was shown between income level pf parents and both sex experience and use of condom; that is, students with low income level tend to have peers who dropped out of class, drink alcohol, etc., which in turn, influence sex on experience of sexual intercourse and less frequent use of condom. This supported the previous studies that showed that risky sexual behaviors (i.e., condom use and the number of sexual partner) were significantly associated with higher levels of antisocial behaviors of peers (i.e., alcohol drinking and drug use)[14, 15]. In addition, students who live with only single parent or no parents tend to have weak connectedness to peers, which in turn, influence on early onset of sex experience and less frequent use of condom use. This implies that trusting relationship with peers influences on HIV risky behaviors but not before starting sexual activities, while peers' antisocial behaviors can be always risk factors of all high school students.

Impact of peers and schools on adolescent's HIV risk behavior have not sufficiently shown due to lack of enough number of studies. Further studies will be warranted in this area.

d. Factor of knowledge of HIV prevention as mediator

Knowledge of HIV prevention was influenced from parental monitoring and school attachment, which in turn influenced on sex experience. This confirmed that, within multi-social systems, knowledge functions as mediator that connects microsystem and HIV risk behaviors. This result supported behavior change models; that is, environmental factors can influence on increased person's knowledge, which could change his/her attitude toward a topic, thus created the desired behavior[54]. Previous studies in the U.S. and China that showed relations between knowledge on HIV/AIDS and sex experience [12, 55]. Current study built on new finding from those of previous studies, which is, knowledge not only functions as cause but also as mediator between environmental factors and behavior.

2. HIV Risk Behaviors and Risk Factors

Results of PLS regression analysis of Model 2 (Figure 5) revealed the risk factors that could trigger HIV risk factors. First, age of the first sex was influenced from income level of parents through antisocial behaviors of peers; that is, students with lower income of their parents tend to have peers with antisocial behaviors, which in turn, influenced on early onset of sexual activities. Second, condom use was influenced from several environmental factors through several paths; 1) from religion through parent-adolescent communication and parental monitoring, implying that student with no religion tend not to have communication with parents and their parents tend not to know what their kids are doing after school or their free time, which in turn, caused less use of condom; 2) from income level of parents through antisocial behaviors of peers; in other words students with lower income of their parents tend to have peers with antisocial behaviors, which in turn, caused less use of condom; 3) from living arrangement through connectedness to peers; that is, students who live with single parent only or no parents tend not have trusting relationship with their peers compared with

the students who live with both parents or with single parent and grandparents, which in turn, influenced on less use of condom. Third, number of partner was influenced from religion through parent-adolescent communication and parental monitoring, implying that student with no religion tend not to have communication with parents or their parents tend not to know what their kids are doing after school or their free time, which in turn, influenced on having multiple sexual partners.

The findings showed that all HIV risk behaviors are influenced from and mediated through multiple factors in different social systems that are situated at varying distances from the adolescent; that is, influences come from macrosystem and exosystem through microsystem. Among the risk behaviors, less use of condom was influenced from and mediated through almost all social systems (macrosystem, exosystem and family- and peer-microsystem). Since condom is the easiest and the most effective way to prevent HIV transmission[1], intervention to multiple components, such as parents and peers, would be suggested.

3. Comparison of PLS and Multivariate Regression Analysis

Comparison of PLS and multivariate regression analysis revealed the existence of the significant paths in PLS that were not appeared as significant in multivariate regression analysis (see Figure 6). This was more apparent with the factors of exosystem and macrosystem. For example in Model 2, there was no influence of religion, income level of parents and living arrangement on HIV risk behaviors was in multivariate regression analysis whereas those factors were indirectly significantly influential to the HIV risk behaviors in PLS. The results supported previous studies. For example, parent-adolescent interrelationships (parent microsystem), such as parental monitoring and parent-adolescent communication, had positive influence to reduce adolescents' HIV risky behaviors[4-8, 10, 12],

whereas influence of socioeconomic status of parents (exosystem) showed mixed results[6, 8, 10, 12]. Those differences might have been occurred because influence of the environmental factors distal to adolescents (or individual) were underestimated in multivariate regression analysis[18], which might have caused no significant influence of factors of macrosystem and exosystem, while there were significant influence in almost all microsystem factors because they were proximal to adolescents.

4. Limitations

The present results should be considered in light of several limitations.

First, the present study was cross-sectional study design where independent variables and outcome variables were simultaneously assessed. Although the study has helped to explore the relationship between environmental factors and HIV risk behaviors, longitudinal studies may be required to make directional inferences.

Second, this study used adolescents' self-reports for study variables. However, one could also argue that participants' response can reflect what they perceive or think about what is happening with parents and peers.

Third, to avoid creating too long questionnaire, the present study applied all parenting measures as "parents" or "parental figures" rather than separately as mothers and fathers, which might not have allowed for an examination of potential differences between mothers' and fathers' parenting practices. Because the gender of the adolescent and the gender of the parent have been shown to effect the degree and frequency of communication and monitoring in the family[51, 56], it would be important for future research to distinguish the gender of both the adolescent and the parent.

Lastly, due to feasibility of the study, the model did not incorporate the mesosystem (interaction of microsystem such as school-peer or parent-school relationships and

interactions), which consists the multi-social systems of Ecodevelopmental Theory. In order to predict high-risk sexual behavior more effectively, expansion of model elaboration may be needed to encompass multiple risk and protective factors.

5. Implications

Nevertheless of the limitations, the present study revealed the existence of multiple mediators that influence on HIV risk behaviors of urban high school adolescents in Honduras. Study showed that HIV risk behaviors are influenced from and mediated through multiple social system situated at different distances from the adolescent, such as macrosystem, exosystem and microsystem. In addition, comparison of PLS and multivariate regression analysis revealed that PLS showed that exosystem and macrosystem, both are distal to the adolescents, are functional to provoke HIV risk behaviors through mediators.

Since there is no similar studies in Central America where countries share the same language, culture, religion, tradition, etc., comparison of the results with those countries cannot be realized. Only two studies in El Salvador examined parental influence on HIV risk behaviors using multivariate regression analysis, showing the influence of parental monitoring or supportive relationships with parents on sex experiences and condom use of secondary school students[7, 57]. Since HIV prevalence rate in most countries in Central America is being increased or remained the same, it is important to understand the HIV transmission mechanism, especially the risk factors of HIV risk behaviors (since most transmission occurred due to sexual intercourse in Central America). The present study suggested the application of Ecodevelopmental Theory with partial least square analysis to respond this challenge.

Further study targeting both in-school and out-of-school adolescents, or targeting out-of-school adolescents will be warranted for further understandings of the mechanism of

adolescents' HIV risk behaviors in Honduras. The present study targeted the adolescents who are enrolled in high schools. However, considering the fact that the enrolment rates of high school level education in Honduras are only 46.3% in Tegucigalpa, 44.4% in San Pedro Sula and 40.3% in other main cities including La Ceiba, there are cautions of generalization of the results to larger urban Honduran adolescent population. This is because the environmental factors surrounding out-of-school adolescents and those of school-going adolescents can be different, which may influence their HIV risk behaviors differently.

VII. CONCLUSIONS

HIV risk behaviors of urban high school adolescents in Honduras are influenced mediated through multiple factors in different social systems that are situated at varying distances from the adolescent; that is, influences come from exosystem through microsystem, which in turn, through knowledge to reach HIV risk behaviors. This took an important step forward in providing more comprehensive understanding of adolescents' HIV risk behaviors as well as offering new insight into HIV prevention of adolescents, especially in Honduras.

Involvement of multiple components, such as parents, schools and peers, was recommended in HIV prevention interventions, instead of focusing on adolescents themselves. Additionally, it was suggested to improve economic condition in Honduras. Improvement of economic condition will provide impacts on not only HIV risk behaviors but also on any other risk factors, of course. Although that, it will be an important political implication with long-term perspectives. The study also suggested the importance of sexual health education to acquire appropriate knowledge on HIV/AIDS to delay the initiation of sexual activity. Currently, most schools in Honduras do not provide sexual health education appropriately. Truly, sexuality and sexual health theme is still taboo in Honduras and many teachers are not comfortable discussing those issues and do not follow the curriculum of sexual health education[52, 53]. Therefore, it is important to break those barriers among teachers so that students can receive appropriate sexual education in a school setting.

Additional studies using both in-school and out-of-school adolescents as well as studies on impact of peers and schools will be warranted for further understandings of the mechanism of adolescents' HIV risk behaviors in Honduras.

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IX. FIGURES

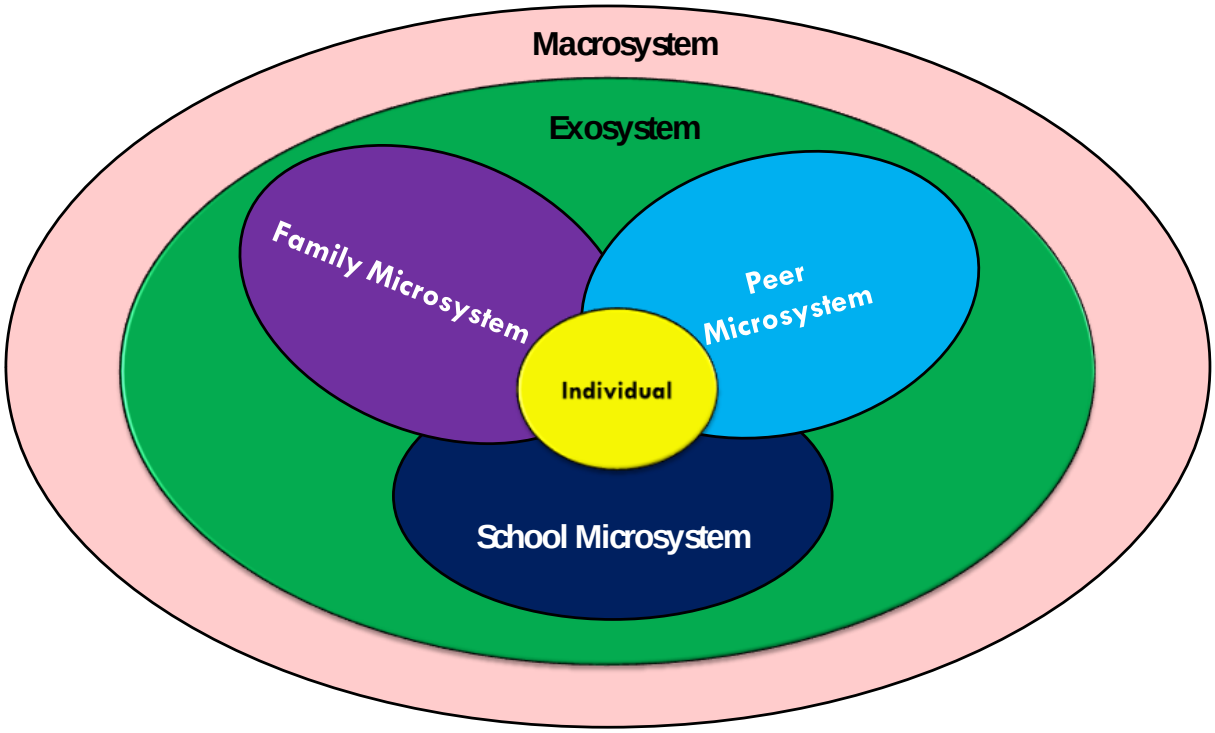


Figure 1: Concept of Ecodevelopmental Theory

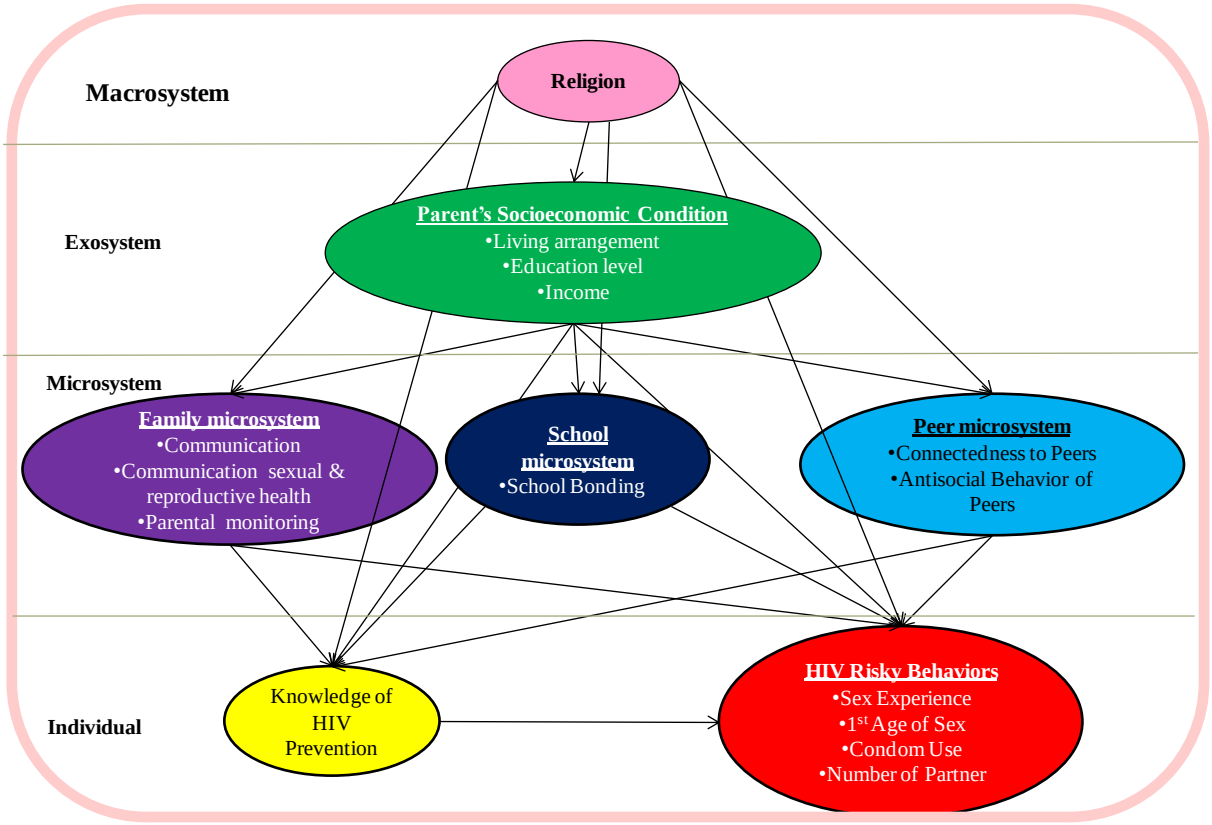


Figure 2: Conceptual model of the present study

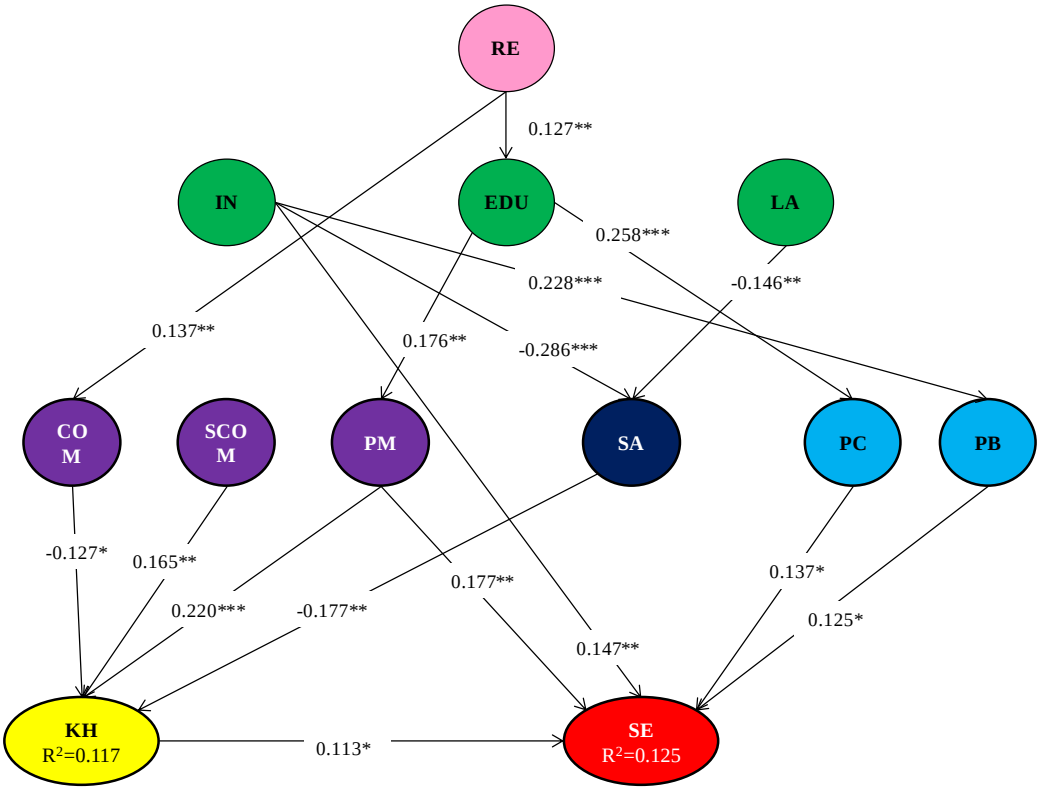


Figure 3: Structural model with significant path coefficients among all participants (Model 1, n=320)

Single-headed arrows are paths that are significantly associated. All parameter estimates are standardized.

*: p < .05, **: p < .01, ***: p < .001.

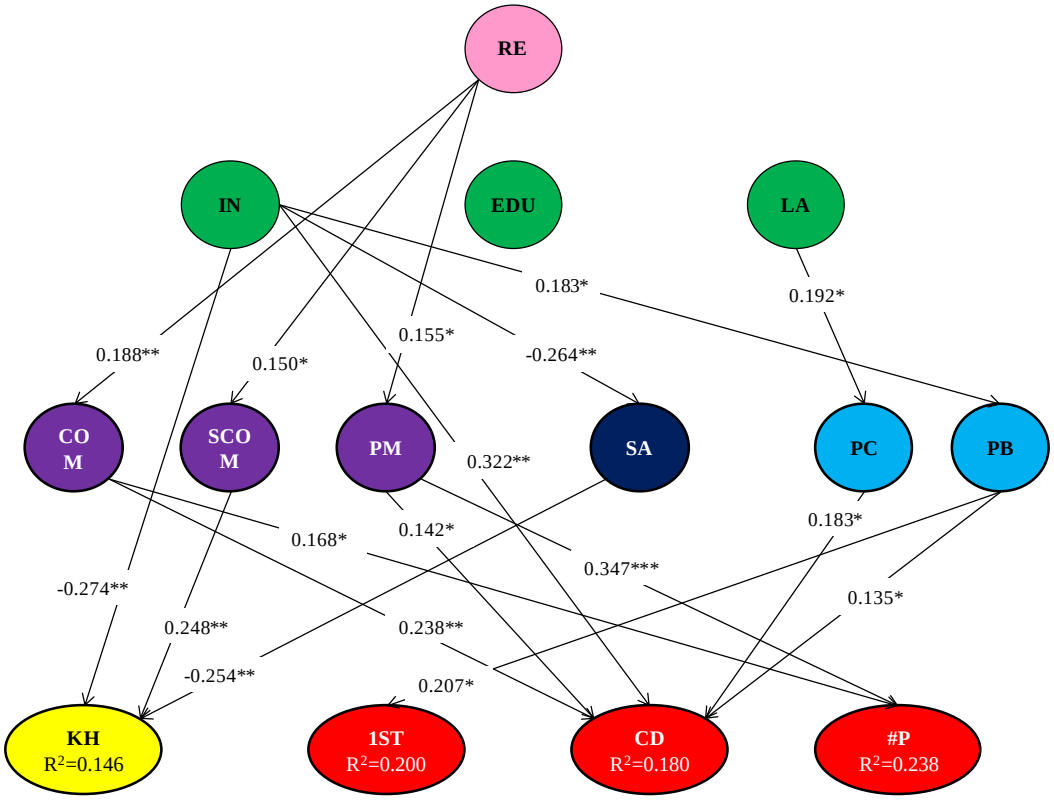
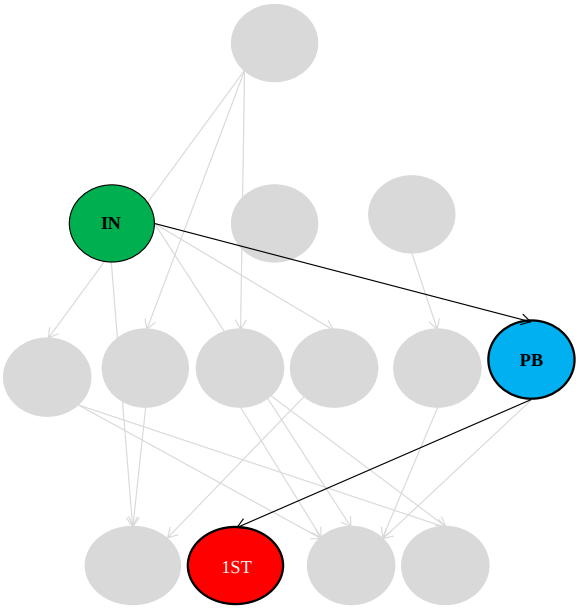


Figure 4: Structural model with significant path coefficients among participants who have had sex (Model 2, n=130)

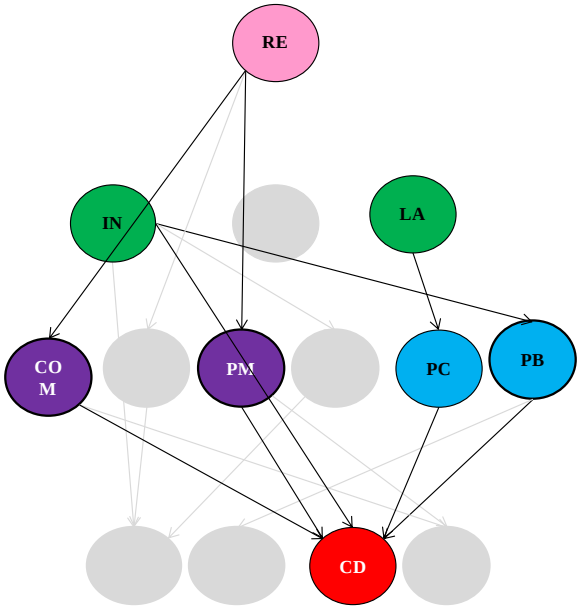
Single-headed arrows are paths that are significantly associated. All parameter estimates are standardized.

*: p < .05, **: p < .01, ***: p < .001.

(a) Age of the 1st sex



(b) Condom use



(c) Number of partners

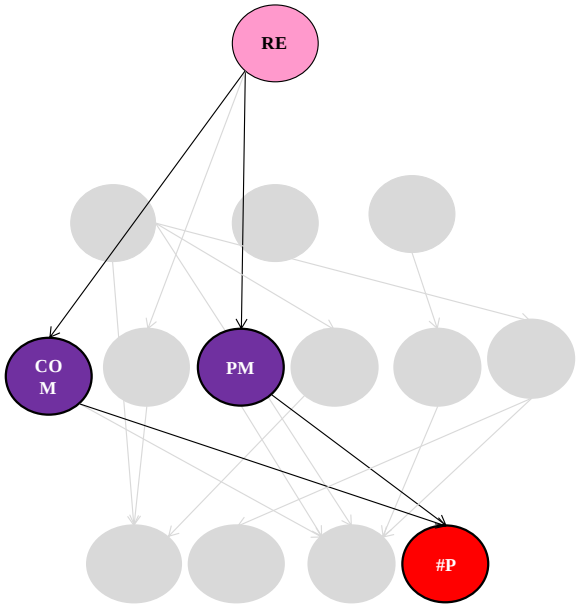
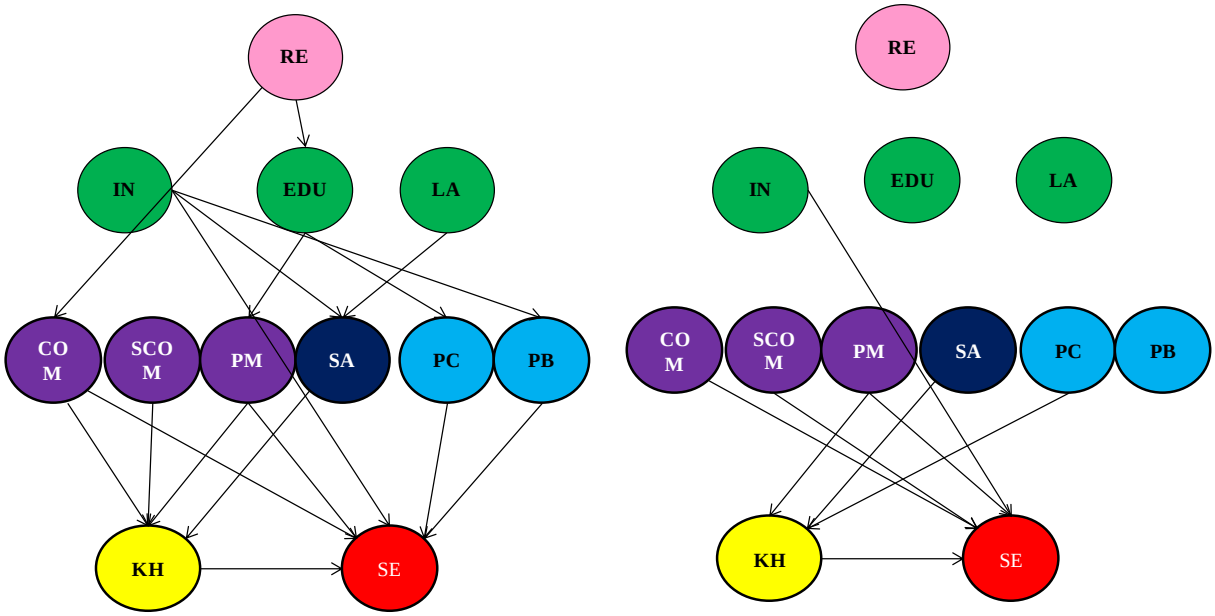


Figure 5: Structural model among participants who have had sex with each HIV risk behaviors.

(a) Model 1



(b) Model 2

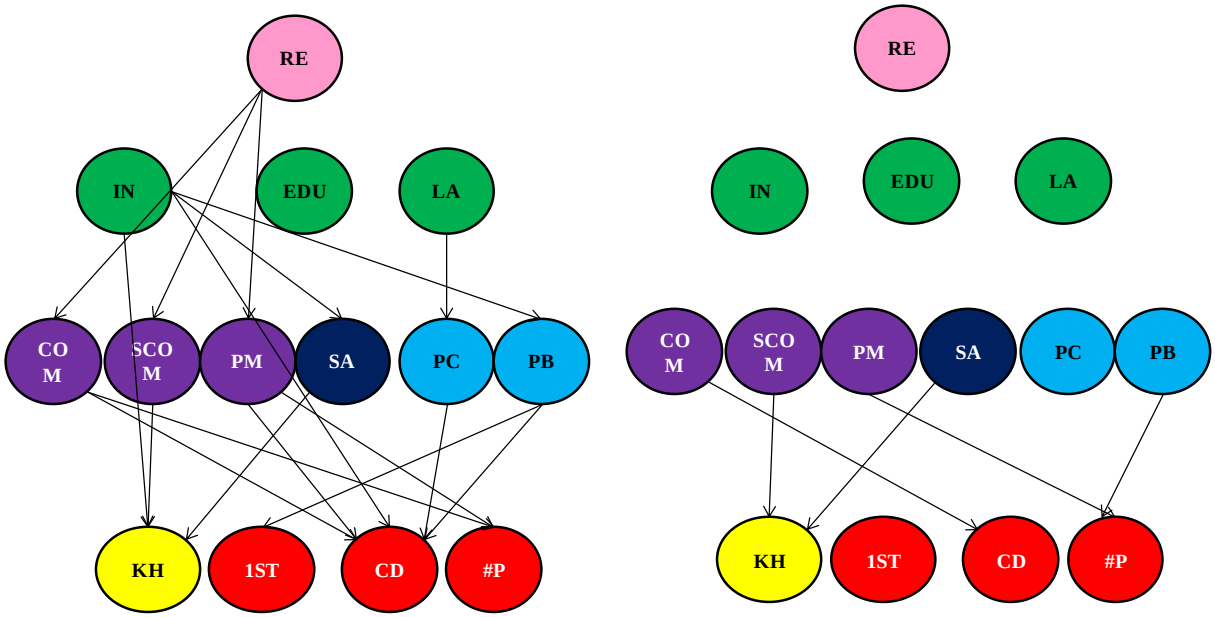


Figure 6: Comparison of PLS regression (left) and multivariate regression analysis (right). Single-headed arrows are paths that are significantly associated.

X. TABLES

Table 1: List of factors and measured variables

Factors	Measured variables	Label
Religion (RE)	religion	RE1
Parent's Income (IN)	parent's income	IN1
Parent's Education Level (EDU)	parent's education level	EDU1
Living Arrangement (LA)	living arrangement	LA1
Parent-adolescent Communication (COM)	satisfied communication	COM1
	listening each other	COM2
	asking what they want	COM3
	discussing calmly	COM4
	sharing ideas and beliefs	COM5
	trying to understand	COM6
	expressing true feeling	COM7
Parent-adolescent Communication on Sexual and Reproductive Issues (SCOM)	drug and alcohol	SCOM1
	Sexual relationship	SCOM2
	HIV/AIDS	SCOM3
	physical change	SCOM4
	anticonceptive use	SCOM5
	STI/STD	SCOM6
	Pregnancy	SCOM7
Parental Monitoring (PM)	allow to stay out late on school nights	PM1
	allow to stay out late on weekends	PM2
	know where they go at night	PM3
	know what they do with free time	PM4
	know where they go most after school	PM5
School Attachment (SA)	school work is meaningful	SA1
	most of classes are interesting	SA2
	enjoy being in school	SA3
	trying to do the best in school	SA4
Connectedness to Peers (PC)	being important to friends	PC1
	being liked from friends	PC2
	not care about my welfare	PC3
	feeling strong bonding	PC4

Table 1: List of factors and measured variables (Continued)

Factors	Measured variables	Label
Antisocial Behavior of Peers (PB)	have been suspended from school	PB1
	have taken alcohol	PB2
	have used illegal drugs	PB3
	have dropped out of school	PB4
Knowledge of HIV Prevention (KH)	knowledge of HIV prevention	KH1
Sex Experience (SE)*	have had sex experience	SE1
Age of the First Sex (1ST)§	age of first sex experience	1ST1
Condom Use (CD)§	condom use in the first sex	CD1
	condom use in the last sex	CD2
	condom use every time	CD3
Number of Sexual Partner(#P)§	number of sexual partner	#P1

* All participants (Model 1, n=320)
§Participants who have had sex (Model 2, n=130)

Table 2: Demographic characteristics and sex experiences in a sample of high school students in urban Honduras (N=320)

Variable	no.	%
City		
Tegucigalpa	114	36%
San Pedro Sula	107	34%
La Ceiba	99	31%
Gender		
Female	191	60%
Male	129	40%
Age		
16	119	37%
17	132	41%
18	58	18%
19	11	3%
Parent's income		
US$ 2,000 ≤	57	18%
US$ 1,000 - US$ 1,999	53	17%
US$ 500 - US$ 999	65	20%
US$ 250 - US$ 499	89	28%
≥ US$ 249	56	18%
Living with		
Both parents	159	50%
Single parent & grandparent(s)	21	7%
Single parent only	91	28%
Grandparent(s) only	23	7%
Others (ex., siblings, by oneself)	26	8%
Parent's education		
University and higher	132	41%
Secondary completed	54	17%
Primary completed	94	29%
Primary uncompleted	36	11%
No education	4	1%
Sex experience		
Yes	130	41%
No	190	59%

Table 3: Loadings of measured variables

Factor	Item	Model1	Model2
RE	RE1	1.000	1.000
IN	IN1	1.000	1.000
EDU	EDU1	1.000	1.000
KA	LA1	1.000	1.000
COM	COM1	0.770	0.763
	COM2	0.814	0.793
	COM3	0.767	0.636
	COM4	0.814	0.739
	COM5	0.692	0.610
	COM6	0.744	0.844
	COM7	0.762	0.750
SCOM	SCOM1	0.696	0.730
	SCOM2	0.780	0.740
	SCOM3	0.787	0.852
	SCOM4	0.757	0.706
	SCOM5	0.672	0.694
	SCOM6	0.734	0.742
	SCOM7	0.622	0.687
PM	PM1	0.536	0.741
	PM2	0.807	0.734
	PM3	0.752	0.702
	PM4	0.857	0.762
	PM5	0.603	0.638
SA	SA1	0.763	0.819
	SA2	0.784	0.657
	SA3	0.539	0.587
	SA4	0.678	0.830
PC	PC1	0.770	0.847
	PC2	0.626	0.443*
	PC3	0.737	0.842
	PC4	0.666	0.681

Table 3: Loadings of measured variables (Continued)

Factor	Item	Model1	Model2
PB	PB1	0.708	0.564
	PB2	0.602	0.941
	PB3	0.817	0.705
	PB4	0.948	0.815
KH	KH1	1.000	1.000
SE	SE1	1.000	-
1ST	1ST1	-	1.000
CD	CD1	-	0.733
	CD2	-	0.777
	CD3	-	0.832
#P	#P1	-	1.000

*: Items that not reliably measure their respective factors and that were not included in the model.

Table 4: Reliability, AVE statistics and discriminant validity test and correlations among all participants (Model 1, n=320)

Construct	Composite reliability	AVE	Discriminant validity											
			RE	IN	EDU	LA	COM	SCOM	PM	SA	PC	PB	KH	SE
RE	1.000	1.000	1.000											
IN	1.000	1.000	0.107	1.000										
EDU	1.000	1.000	0.125	0.520	1.000									
LA	1.000	1.000	0.108	0.304	0.300	1.000								
COM	0.909	0.588	0.143	0.054	0.113	0.013	0.767							
SCOM	0.858	0.485	0.068	0.140	0.123	-0.009	0.331	0.682						
PM	0.841	0.520	0.123	0.125	0.203	0.101	0.350	0.344	0.721					
SA	0.750	0.515	-0.013	-0.326	-0.182	-0.235	0.120	0.102	0.189	0.718				
PC	0.788	0.486	0.056	0.262	0.332	0.163	0.148	0.151	0.290	-0.047	0.697			
PB	0.755	0.510	0.111	0.258	0.177	0.066	0.163	0.196	0.341	-0.041	0.270	0.714		
KH	1.000	1.000	0.081	0.067	0.115	0.058	-0.002	0.187	0.222	-0.116	0.160	0.087	1.000	
SE	1.000	1.000	0.006	0.175	0.130	0.087	0.155	0.102	0.254	0.022	0.024	0.197	0.136	1.000

Diagonal elements (bold style) are square roots of the AVE statistics (discriminant validity test). Off-diagonal elements are the correlations between the latent variables calculated in PLS.

Table 5: Reliability, AVE statistics and discriminant validity test and correlations among participants who have had sex (Model 2, n=130)

Construct	Composite reliability	AVE	Discriminant validity									
			RE	IN	EDU	LA	COM	SCOM	PM	SA	PC	PB
RE	1.000	1.000	1.000									
IN	1.000	1.000	0.089	1.000								
EDU	1.000	1.000	0.094	0.519	1.000							
LA	1.000	1.000	0.150	0.368	0.350	1.000						
COM	0.895	0.553	0.171	-0.065	-0.094	-0.078	0.743					
SCOM	0.891	0.508	0.160	0.160	0.116	0.084	0.165	0.713				
PM	0.871	0.579	0.156	-0.092	0.045	0.047	0.325	0.352	0.761			
SA	0.787	0.556	0.081	-0.334	-0.257	-0.178	0.257	0.118	0.302	0.746		
PC	0.777	0.555	0.063	0.258	0.251	0.287	0.122	0.131	0.114	-0.073	0.745	
PB	0.779	0.542	0.124	0.208	0.147	0.069	0.143	0.163	0.273	0.006	0.252	0.736

Diagonal elements (bold style) are square roots of the AVE statistics (discriminant validity test). Off-diagonal elements are the correlations between the latent variables calculated in PLS.

Table 5: Reliability, AVE statistics and discriminant validity test and correlations among participants who have had sex (Continued)

Construct	Composite reliability	AVE	Discriminant validity			
			KH	1ST	CD	#P
KH	1.000	1.000	1.000			
1ST	1.000	1.000	0.136	1.000		
CD	0.807	0.584	-0.057	-0.033	0.764	
#P	1.000	1.000	0.201	0.399	-0.048	1.000

Table 6: Path coefficients, standard deviation and t-statistics of structural model among all participants (Model 1, n=320)

Path	Sample Mean	Standard Deviation	T Statistics
RE -> IN	0.108	0.056	1.926
RE -> EDU	0.127	0.054	2.335**
RE -> LA	0.109	0.055	1.956
RE -> COM	0.137	0.053	2.509**
RE -> SCOM	0.071	0.043	1.233
RE -> PM	0.098	0.050	1.934
RE -> SA	0.057	0.040	0.816
RE -> PC	0.044	0.033	0.173
RE -> PB	0.088	0.049	1.704
RE -> KH	0.068	0.046	1.338
RE -> SE	-0.074	0.047	1.391
EDU -> COM	0.116	0.063	1.741
IN -> COM	-0.055	0.042	0.187
IN -> SCOM	0.123	0.064	1.833
IN -> PM	0.054	0.041	0.332
IN -> SA	-0.286	0.065	4.438***
IN -> PC	0.112	0.058	1.923
IN -> PB	0.228	0.061	3.733***
IN -> KH	-0.089	0.059	1.308
IN -> SE	0.147	0.062	2.403**
EDU -> SCOM	0.090	0.055	1.414
EDU -> PM	0.176	0.072	2.427**
EDU -> SA	0.054	0.041	0.255
EDU -> PC	0.258	0.064	4.014***
EDU -> PB	0.074	0.052	1.092
EDU -> KH	0.060	0.044	0.948
EDU -> SE	0.056	0.043	0.630
LA -> COM	-0.061	0.044	0.718
LA -> SCOM	-0.079	0.053	1.398
LA -> PM	0.060	0.045	0.765
LA -> SA	-0.146	0.055	2.796**
LA -> PC	0.065	0.045	1.147
LA -> PB	-0.052	0.040	0.738
LA -> KH	-0.050	0.038	0.299
LA -> SE	0.058	0.043	0.974

Table 6: Path coefficients, standard deviation and t-statistics of structural model among all participants (Model 1, n=320) (Continued)

Path	Sample Mean	Standard Deviation	T Statistics
COM -> KH	-0.127	0.059	2.225*
COM -> SE	0.105	0.058	1.688
SCOM -> KH	0.165	0.057	2.881**
SCOM -> SE	-0.060	0.048	0.842
PM -> KH	0.220	0.067	3.309***
PM -> SE	0.177	0.066	2.668**
SA -> KH	-0.177	0.056	3.106**
SA -> SE	0.070	0.049	1.117
PC -> KH	0.101	0.058	1.629
PC -> SE	0.137	0.066	2.025*
PB -> KH	-0.054	0.042	0.598
PB -> SE	0.125	0.060	2.001*
KH -> SE	0.113	0.056	2.002*

*: $p < .05$, **: $p < .01$, ***: $p < .001$.

Table 7: Path coefficients, standard deviation and t-statistics of structural model among participants who have had sex (Model 2, n=130)

Path	Sample Mean	Standard Deviation	T Statistics
RE -> IN	0.109	0.076	1.182
RE -> EDU	0.105	0.071	1.316
RE -> LA	0.154	0.084	1.793
RE -> COM	0.188	0.079	2.402**
RE -> SCOM	0.150	0.077	1.982*
RE -> PM	0.155	0.073	2.096*
RE -> SA	0.133	0.074	1.674
RE -> PC	0.072	0.053	0.204
RE -> PB	0.120	0.068	1.578
RE -> KH	0.071	0.054	0.776
RE -> 1ST	-0.095	0.066	1.158
RE -> CD	-0.083	0.061	0.510
RE -> #P	0.084	0.061	1.004
IN -> COM	-0.094	0.069	0.200
IN -> SCOM	0.150	0.095	1.353
IN -> PM	-0.188	0.103	1.754
IN -> SA	-0.264	0.106	2.504**
IN -> PC	0.146	0.089	1.387
IN -> PB	0.183	0.092	1.982*
IN -> KH	-0.274	0.104	2.653**
IN -> 1ST	-0.152	0.104	1.187
IN -> CD	0.322	0.111	2.679**
IN -> #P	-0.113	0.076	1.391
EDU -> COM	-0.103	0.070	1.127
EDU -> SCOM	0.090	0.068	0.515
EDU -> PM	0.125	0.084	1.249
EDU -> SA	-0.125	0.082	1.338
EDU -> PC	0.126	0.083	1.403
EDU -> PB	0.100	0.074	0.730
EDU -> KH	-0.077	0.058	0.221
EDU -> 1ST	0.102	0.076	0.815
EDU -> CD	0.090	0.068	0.744
EDU -> #P	-0.079	0.060	0.707
LA -> COM	-0.106	0.070	1.065
LA -> SCOM	0.079	0.060	0.050

*: $p < .05$, **: $p < .01$, ***: $p < .001$.

Table 7: Path coefficients, standard deviation and t-statistics of structural model among participants who have had sex (Continued)

Path	Sample Mean	Standard Deviation	T Statistics
LA -> PM	0.098	0.072	0.744
LA -> SA	-0.093	0.065	0.946
LA -> PC	0.192	0.095	2.099*
LA -> PB	-0.083	0.064	0.524
LA -> KH	0.078	0.060	0.290
LA -> 1ST	0.106	0.074	1.163
LA -> CD	0.133	0.083	1.280
LA -> #P	0.069	0.053	0.259
COM -> KH	-0.109	0.071	1.372
COM -> 1ST	-0.076	0.056	0.484
COM -> CD	0.238	0.089	2.588**
COM -> #P	0.168	0.093	2.060*
SCOM -> KH	0.248	0.087	2.740**
SCOM -> 1ST	0.104	0.074	0.624
SCOM -> CD	-0.161	0.093	1.449
SCOM -> #P	-0.079	0.064	0.211
PM -> KH	0.122	0.081	1.311
PM -> 1ST	0.106	0.074	1.115
PM -> CD	0.142	0.087	1.962*
PM -> #P	0.347	0.098	3.697***
SA -> KH	-0.254	0.093	2.743**
SA -> 1ST	0.107	0.076	0.979
SA -> CD	0.116	0.085	0.883
SA -> #P	0.095	0.067	1.124
PC -> KH	0.117	0.079	1.190
PC -> 1ST	-0.120	0.081	1.354
PC -> CD	-0.183	0.093	1.964*
PC -> #P	-0.075	0.056	0.716
PB -> KH	-0.096	0.070	0.700
PB -> 1ST	0.207	0.097	2.084*
PB -> CD	0.135	0.081	1.960*
PB -> #P	0.141	0.085	1.625
KH -> 1ST	0.131	0.085	1.454
KH -> CD	0.094	0.068	0.992
KH -> #P	0.153	0.086	1.751

*: $p < .05$, **: $p < .01$, ***: $p < .001$.

Table 8: Multiple regression analysis of HIV risk behaviors (sex experience, age of the 1st sex, condom use and number of partner) and knowledge of HIV prevention.

Factor	Model 1		Model 2			
	SE	KH	1ST	CD	#P	KH
RE	0.897	0.338	1.579	1.136	0.306	0.927
IN	0.225	1.083	0.742	2.015	0.922	1.609
EDU	0.482	0.200	0.198	1.019	0.209	0.874
LA	2.081*	1.692	2.022	0.286	0.999	0.759
COM	6.177*	3.066	0.084	5.688*	0.779	0.176
SCOM	4.545*	3.422	0.115	1.185	0.750	5.433*
PM	5.079*	9.880**	0.336	0.287	9.960*	0.435
SA	0.756	6.130*	0.072	0.409	0.450	7.138**
PC	3.123	3.972*	0.248	0.979	0.305	0.611
PB	1.152	0.123	2.730	0.002	4.455*	0.110
KH	4.693*	NA	1.810	0.087	2.609	NA

*: $p < .05$, **: $p < .01$.

XI. APPENDIX

Original Questionnaire

CONSENTIMIENTO

Mi nombre es Shiho Tobita, la estudiante doctoral de la Universidad Tohoku, Japón. El objetivo de este estudio es evaluar la relación del comportamiento riesgo de VIH y los factores familiares para la futura implementación de los programas de VIH/SIDA en Honduras, orientados a elevar las condiciones de vida de la población en el país. Con tal motivo, me gustaría hacerle algunas preguntas sobre los miembros y caracteristicas de Ud., su familia, sus amigos y su escuela. La información que nos brinde es estrictamente confidencial.

Parte I

1. ¿Cuántos años cumplidos tiene? _____

2. ¿Cuántos gana en su familia por **UN MES**? _____

Marque con O *lo que aplica*

3. ¿Ud. es hombre o mujer?

1	2
Hombre	Mujer

4. Religión

1	2	3	4	5	6
Católico(a)	Protestante	Islámico(a)	Budista	Otra religión	Ninguna

5. ¿Con quién vive? *Marque con* O *todo que aplica*

1	2	3	4	5	6
Padre	Madre	Hermana(o)	Tio(a)	Abuelo(a)	No pariente

7	Otros (especifique:)

Marque con O *lo que aplica*

6. ¿Cuál es el estado civil de su padre/madre?

1	2	3	4
Casado(a)	Union libre	Divorciado(a)/separado(a)	Viudo(a)

7. Religión (**1. Católico(a), 2.Protestante, 3.Islámico(a), 4.Budista, 5.Otra religión, 6.Ninguna**)

Padre: _____

Madre: _____

Otros parientes con quien Ud. vive: _____

Appendix: Original Questionnaire (Continued)

8. ¿Cuál fue el grado o año de educación más alto que su padre/madre aprobó? (**1.Nunca fue la escuela, 2. Primaria incompleta, 3.Primaria completa, 4. Secundaria incompleta, 5.Secundaria completa, 6.Superior, 7. No sabe**)

   Padre: _____

   Madre: _____

   Otros parientes con quien Ud. vive: _____

9. Actualmente ¿su padre/madre y/o otros parientes con quien Ud. vive trabaja?

Padre	1	2	3
	Sí	No	No vivo con el
Madre	1	2	3
	Sí	No	No vivo con ella
Otros parientes	1	2	3
	Sí	No	No vivo con ellos

10. ¿Cuál es la ocupación de su padre/madre y/o otros parientes con quien Ud. vive que contribuye al ingreso de su familia principalmente?

    1. Padre_____
    2. Madre _____
    3. Otros parientes con quien Ud. vive: _____

Ahora conteste sobre su padre/madre y/o otros parientes con quien Ud. vive (Marque con O *lo que aplica)*

11. Mi padre/madre y/o otros parientes estamos satisfechos con la manera de comunicación el uno al otro.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

12. Nos escuchamos muy bien.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

13. Podemos preguntarnos lo que queremos.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

14. Podemos hablarnos de problemas con calma.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

Appendix: Original Questionnaire (Continued)

15. Hablamos de nuestras ideas y creencias el uno al otro.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

16. Tratamos de entender nuestros sentimientos.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

17. Expresamos nuestros verdaderos sentimientos.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

18. ¿Con qué frecuencia Ud. se comunica con su padre/madre y/o otros parientes con quien Ud. vive sobre siguientes temas? (1. Nunca; 2. Raramente, 3. A veces, 4. A menudo 5. Con bastante frecuencia)?

1. Drogas y alcohol

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

2. Relaciones sexuales

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

3. VIH/SIDA

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

4. Cambios fisicos

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

5. Uso de (métodos) anticonceptivos

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

6. Infecciones de transmisión sexual o enfermedades de transmisión sexual

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

7. Embarazo

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

8. Cuidar de los hijos y/o el ser padres

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

Appendix: Original Questionnaire (Continued)

9. Matrimonio

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

10. Abstinencia (no mantener relaciones sexuales, no tener relaciones sexuales)

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

19. ¿Está cómodo al hablar con su padre/madre y/o otros parientes con quien Ud. vive sobre siguietnes temas? (1: Totalmente incómodo; 2: Incómodo 3: Ninguno; 4: Cómodo; 5 Muy cómodo.)

1. Drogas y alcohol

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

2. Relaciones sexuales

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

3. VIH/SIDA

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

4. Cambios fisicos

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

5. Uso de (métodos) anticonceptivos

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

6. Infecciones de transmisión sexual o enfermedades de transmisión sexual

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

7. Embarazo

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

8. Cuidar de los hijos y/o el ser padres

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

9. Matrimonio

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

10. Abstinencia (no mantener relaciones sexuales, no tener relaciones sexuales)

1	2	3	4	5
Totalmente incómodo	Incómodo	Ninguno	Cómodo	Muy cómodo

Appendix: Original Questionnaire (Continued)

Su madre/padre y/o otros parientes con quien Ud. vive…

20. ¿ Le perimiten a Ud. estar fuera de casa hasta una hora muy avanzada (o altas horas) de la noche durante la semana?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

21. ¿Le permiten a Ud. estar fuera de casa hasta una hora muy avanzada (o altas horas) de la noche en el fin de semana?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

22. ¿Cuánto tratan de saber a dónde va Ud. en la noche?

1	2	3
Nada	Ninguno	Extremadamente

23. ¿Cuánto tratan de saber qué hace Ud. en el tiempo libre?

1	2	3
Nada	Ninguno	Extremadamente

24. ¿Cuánto tratan de saber a dónde va Ud. la mayoría del timepo después de la escuela?

1	2	3
Nada	Ninguno	Extremadamente

25. ¿Hasta qué punto (en qué medida) saben a dónde va Ud. En la noche?

1	2	3	4	5
Totalmente no sabe	No sabe	Ninguno	Sabe	Siempre sabe

26. ¿Hasta qué punto (en qué medida) saben qué Ud. hace en el tiempo libre?

1	2	3	4	5
Totalmente no sabe	No sabe	Ninguno	Sabe	Siempre sabe

27. ¿Hasta qué punto (en qué medida) saben a dónde va Ud. mayoria del timepo después de la escuela?

1	2	3	4	5
Totalmente no sabe	No sabe	Ninguno	Sabe	Siempre sabe

28. ¿Hasta qué punto (en qué medida) saben quiénes son sus amigos?

1	2	3	4	5
Totalmente no sabe	No sabe	Ninguno	Sabe	Siempre sabe

Mi madre/padre y/o otros parientes con quien yo vivo…

29. Pedimos ayuda del uno al otro.

1	2	3	4	5
No verdadero	Casi no verdadero	A veces cierto	Cierto en mayoría de casos	Siempre cierto

30. Nos gusta pasar el tiempo libre juntos.

1	2	3	4	5
No verdadero	Casi no verdadero	A veces cierto	Cierto en mayoría de casos	Siempre cierto

Appendix: Original Questionnaire (Continued)

31. Nos sentimos muy cercanos.

1	2	3	4	5
No verdadero	Casi no verdadero	A veces cierto	Cierto en mayoría de casos	Siempre cierto

32. Planeamos actividades familares facilmente.

1	2	3	4	5
No verdadero	Casi no verdadero	A veces cierto	Cierto en mayoría de casos	Siempre cierto

33. Estoy disponible cuando mis padreos quieren hablar conmigo.

1	2	3	4	5
No verdadero	Casi no verdadero	A veces cierto	Cierto en mayoría de casos	Siempre cierto

34. Escucho lo que mis padres tienenque decirme, anque no estoy acuerdo.

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

Conteste sobre su padre/madre y/o otros parientes con quien Ud. vive

35. ¿Con qué frecuencia Ud. grita o habla Ud. a ellos en voz alta, sentiéndose irritado o enojado?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

36. ¿Come Ud. las comidas con ellos?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

37. Cuando Ud. y ellos se proponen hacer algo divertido, ¿se resulta divertido en realidad?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

38. ¿Con qué frecuencia le dicen ellos a Ud. que Ud. es malo o que no es tan bueno como otros?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

39. ¿Con qué frecuencia se siente Ud. que las tareas de la escuela que se le a asignado son significativos y importantes?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

40. ¿Qué tan interesantes son la mayoría de sus clases para Ud.?

1	2	3	4	5
Muy interesante	Interesante	Ninguno	Aburrido	Muy aburrido

Appendix: Original Questionnaire (Continued)

41. ¿Creé Ud. que lo que esta aprendiendo en la escuela va a beneficiarle en el futuro?

1	2	3	4	5
Muy importante	Importante	Ninguno	No es importante	Totalmente no es importante

Ahora piense en el último año en la escuela...

42. ¿Con qué frecuencia disfrutó Ud. estar en la escuela?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

43. ¿Con qué frecuencia odió Ud. estar en la escuela?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

44. ¿Con qué frecuencia trataba de hacer Ud. lo mejor posible en la escuela?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

Durante las ultimas cuatro semanas

45. ¿Con qué frecuencia no fue Ud. a la escuela por la enfermedad?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

46. ¿Con qué frecuencia no fue Ud. a la escuela por escaparse?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

47. ¿Con qué frecuencia no fue Ud. a la escuela por otras razones?

1	2	3	4	5
Nunca	Raramente	A veces	A menudo	Con bastante frecuencia

48. Juntando sus notas (ó calificaciones), ¿cuál es su nota, por ejemplo del año pasado?

    Casi _____ (especifique su nota. Ej: casi 80, casi 50, …)

49. Mis amigos me respetan.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

50. No soy importante para mis amigos.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

Appendix: Original Questionnaire (Continued)

51. A mis amigos les agrado.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

52. Yo puedo contar con mis amigos.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

53. A mis amigos no les importa mi bienestar

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

54. Siento que tengo un vínculo afectivo muy fuerte con mis amigos.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

55. Mis amigos cuidan de mí.

1	2	3	4	5
Muy en desacuerdo	En desacuerdo	Indeciso	De acuerdo	Muy de acuerdo

Piense en sus 4 mejores amigos;

56. En el último año, ¿cuántos amigos suyos se han suspendido de la escuela?

1	2	3	4	5
Nadie	Uno	Dos	Tres	Cuatro

57. En el último año, ¿cuántos amigos suyos han robado o taratado de robar vehiclos, como carros o motocicletas?

1	2	3	4	5
Nadie	Uno	Dos	Tres	Cuatro

58. En el último año, ¿cuántos amigos suyos han tomado alcohol?

1	2	3	4	5
Nadie	Uno	Dos	Tres	Cuatro

59. En el último año, ¿cuántos amigos suyos han sido detenidos (arrestados)?

1	2	3	4	5
Nadie	Uno	Dos	Tres	Cuatro

60. En el último año, ¿cuántos amigos suyos han usado o vendido drogas?

1	2	3	4	5
Nadie	Uno	Dos	Tres	Cuatro

61. En el último año, ¿cuántos amigos suyos han dejado de estudiar?

1	2	3	4	5
Nadie	Uno	Dos	Tres	Cuatro

Appendix: Original Questionnaire (Continued)

Parte II

Marque con O *todo que aplica*

62. ¿De qué fuentes de información consigue usted más sobre el SIDA? Circule todas las fuentes mencionadas encuentros¿Alguna otra fuente?

	Radio		Escuelas/maestros
	Televisión		Comunitarios
	Periódicos/revistas		Amigos
	Trifolios/afiches		Parientes
	Trabajadores de salud		Audiovisuales/películas
	Iglesia		Otro (especifique)_____

63. ¿Qué puede hacer una persona para evitar o reducir el riesgo de contraer el virus que causa el VIH/SIDA? Circule todas las formas mencionadas.
    1. ( ) Abstenerse de tener sexo
    2. ( ) Usar condones
    3. ( ) Tener sexo con una sola pareja/serle fiel a su pareja
    4. ( ) Disminuir el número de parejas sexuales
    5. ( ) No tener sexo con prostitutas
    6. ( ) No tener sexo con homosexuales
    7. ( ) Evitar transfusiones de sangre
    8. ( ) Evitar inyecciones
    9. ( ) No besarse
    10. ( ) No abrazar personas con sida
    11. ( ) Evitar picaduras de mosquito
    12. ( ) Tener buena dieta
    13. ( ) Evitar compartir platos, cubiertos y comida con personas infectadas
    14. ( ) No tener penetración en la rel.sexual

Marque con O *lo que aplica*

64. ¿Es posible que una persona que parece saludable pueda tener el virus que causa el SIDA?

1	2	3
Sí	No	No sabe

65. ¿Puede ser transmitido el virus que causa el SIDA de una madre infectada al hijo?

1	2	3
Sí	No	No sabe

66. Si algún miembro de su familia contrajera el virus que causa el SIDA, ¿usted querría mantenerlo en secreto?

1	2	3
Sí	No	No sabe

67. En su opinión, si una profesora tuviera el virus que causa el SIDA pero no está enferma, ¿Se le debería permitir a ella seguir dando clases?

1	2	3
Sí	No	No sabe

Appendix: Original Questionnaire (Continued)

68. ¿Usted cree que un centro educativo se puede negar a recibir a un niño o niña que esta enfermo(a) con el virus que causa el SIDA?

1	2	3
Sí	No	No sabe

69. ¿Quién debería decidir como protegerse en las relaciones sexuales, el hombre, la mujer o ambos?

1	2	3
El hombre	La mujer	Ambos

70. Si usted le pidiera a su pareja que usara condón para prevenir una ITS/VIH SIDA, ¿usted cree que él aceptaría?

1	2	3
Sí	No	No sabe

71. ¿Ha tenido Ud. alguna enfermedad adquirida mediante contacto sexual (venérea) durante los últimos 12 meses?

1	2	3
Sí	No	No sabe

72. La última vez que usted tuvo problema de las de arriba, ¿Buscó usted consejo o tratamiento?

1	2	3	4
Sí	No	No sabe	No corresponde

73. ¿Cuántos años tenía usted cuando tuvo su primera relación sexual (si ha tenido)?

1	2
Nunca ha tenido	Edad en años (……)

74. La primera vez que tuvo relaciones sexuales, ¿usaron condón?

1	2	3	4
Sí	No	No sabe	No corresponde

75. Usted o su pareja usaron algún otro método anticonceptivo?

1	2	3	4
Sí	No	No sabe	No corresponde

76. ¿La persona con quien usted tuvo su primera relación sexual era mayor que usted, más jóven que usted, tenía más o menos la misma edad que usted?

1	2	3	4	5
Nunca he tenido	Mayor	Mas jóven	Misma edad	No sabe

77. ¿Cuándo fue la última vez que tuvo relaciones sexuales? (Si menos de 12 meses, registre respuesta en días, semanas o meses. Si 12 meses (1 año) o mas, registre la respuesta en años.)

Días	Semanas	Meses	Años	
				No corresponde

78. La última vez que tuvo relaciones sexuales con esta (segunda/ tercera) persona ¿usaron condón?

1	2	3	4
Sí	No	No sabe	No corresponde

79. ¿Usaron condón cada vez que usted tuvo relaciones sexuales con esta persona en los últimos 12 meses?

1	2	3	4
Sí	No	No sabe	No corresponde

80. ¿Cuál es su relación con esa persona con quien tuvo relaciones sexuales?

1	2	3	4	5
Novio(a)	Amigo(a)	Conocido(a) casual	Otro (especifique) _____	No corresponde

81. En total ¿Con cuántas personas diferentes ha tenido usted relaciones sexuales durante toda la vida?

    1. Número de parejas toda la vida (si no recuerda, trate de obtener una estimación): _____

    2. No corresponde

82. ¿Dónde Ud. piensa que se puedan conseguir condones (no atravez de sus amigos ni su familia)?
    Marque con O *todo que aplica*
    1. ( ) Hospital
    2. ( ) Clínica de materno infantil
    3. ( ) Otra clínica
    4. ( ) Centro de Salud
    5. ( ) Pulperia/supermercado
    6. ( ) Farmacia
    7. ( ) Otro (especifique)_____

83. ¿Alguna vez se ha hecho la prueba para saber si tiene el virus que causa el VIH/SIDA?

1	2	3
Sí	No	No sabe

FINAL DEL CUESTIONARIO
¡MUCHAS GRACIAS!

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